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AN INVESTIGATION OF THE MODIFIABILITY OF VISUAL INTEGRATIVE ABILITIES IN CHILDREN.

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IN ORDER TO EXAMINE THE EFFECTS OF TRAINING AND SOCIOECONOMIC CLASS UPON VISUAL INTEGRATIVE ABILITIES AND THEIR RAMIFICATION IN THE THEORIES OF PIAGET AND WERNER, 60 FIRST-GRADE MALE CHILDREN WERE ASSIGNED TO ONE OF THREE TRAINING CONDITIONS. HALF OF THE BOYS WERE FROM A BETTER THAN AVERAGE SOCIOECONOMIC BACKGROUND WHILE THE REMAINDER WERE DRAWN FROM LESS THAN AVERAGE SOCIOECONOMIC BACKGROUNDS. SUBJECTS WERE DRAWN FROM THE KNOX COUNTY SCHOOL SYSTEM AND HAD AT LEAST DULL-NORMAL INTELLIGENCE. THE FOLLOWING HYPOTHESES WERE GENERATED--(1) A DEVELOPMENTAL SEQUENCE FOR PERCEPTUAL INTEGRATED ABILITIES CAN BE ACCELERATED WITH TRAINING, (2) TRAINING WILL BE MORE EFFECTIVE WITH CHILDREN FROM AN ENRICHED HOME ENVIRONMENT AND LESS EFFECTIVE WITH CHILDREN FROM A STILTED HOME ENVIRONMENT, (3) A "RICH" ENVIRONMENT WILL BE MORE CONDUCIVE TO INTEGRATED PERCEPTION, AND (4) THE SPECIFICITY OF THE TRAINING TASKS WILL BE A SIGNIFICANT FACTOR IN A POST-TRAINING TEST OF ABILITY TO PERCEPTUALLY INTEGRATE IN A HIERARCHIC MANNER. THE RESULTS SUPPORTED THE FIRST, SECOND, AND FOURTH HYPOTHESES. THE THIRD HYPOTHESIS SHOWED A TREND IN THE PREDICTED DIRECTION. INTELLIGENCE WAS NOT FOUND TO BE A DETERMINABLE FACTOR IN THE ONTOGENY OF PERCEPTUAL ABILITIES. IMPLICATIONS FOR DEVELOPMENTAL THEORY WERE DISCUSSED. (AUTHOR)

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AN INVESTIGATION OF THE MODIFIABILITY OF VISUAL INTEGRATIVE ABILITIES IN CHILDREN

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June 1968

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May 15, 1968

To the Graduate Council:

I am submitting herewith a dissertation written by Robert J. Resnick entitled "An Investigation of the Modifiability of Visual Integrative Abilities in Children." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Vice President for
Graduate Studies and Research

AN INVESTIGATION OF THE MODIFIABILITY OF VISUAL INTEGRATIVE ABILITIES IN CHILDREN

A Dissertation
Presented to
The Graduate Council of
The University of Tennessee

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

by
Robert J. Resnick
June 1968

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CHAPTER I

INTRODUCTION

Nativism and Empiricism

Theoretically and pragmatically the ability to integrate objects in the visual-perceptual world has been of major concern to the psychologist. However, more than one writer has referred to the long controversy between empiricism and nativism in relation to perceptual abilities (see Pratt, 1950). The remarks of Allport (1955) appear representative when he writes:

> Do percepts and their physiological patterns occur immediately and in their full character the first time we experience a given stimulus object? That is, do they depend only on the native or congenital constitution of the organism? Or do they have to develop gradually, through a course of familiarization or training? These questions, . . . (state) the issue between nativism and empiricism. . . (p. 86).

The literature is replete with articles concerning this vitriolic debate. For example, Pastore (1960) believes that the major features of perception are determined by intrinsic properties of the nervous system and that learning factors have no determinable influence. At most, learning factors must be assigned, according to this author, a secondary role; they may exert an influence but only when the perception-to-be-modified is already an existant one. Gibson and Gibson (1955) take the opposite extreme. It is their contention that the supplement to the sensations is the result of learning and that learning comes from past experience. For an accurate percept is one that is enriched by past experiences; a less accurate percept is one that is not enriched by previous experience. Zuckerman and Rock (1957) believe that both innate and experiential factors are relevant to the study of visual perception. They write that various aspects of the phenomenal world and, in particular, the segregation and shape of visual forms are given by inborn organizing processes. However, percepts may be modified and enriched by experiential factors. The effects of such factors presupposes the prior existance of visual forms, that is, perceptual organization occurs first, then experience exerts its influence.

Werner's Developmental Theory

Hienz Werner's (1948, 1957) Genetic Theory epitomizes the organismic approach to the ontogeny of visual perception.

Basic to the theory is the principle that development proceeds from a state of relative globality and lack of differentiation to a state of increasing differentiation and integration. This fundamental law of development, according to Werner, has been demonstrated in the genesis of the nervous system and, therefore, may be logically applied to the mental functions, per se. It is his contention that a characteristic pattern of integrative processes appears at each stage in the evolution of the organism, e.g. perception, motor behavior, thinking, personality. However, only the material relevant to the development of perception will be delineated here (Those readers interested in the development of other areas are referred to the articles by Friedman, 1953; Siegal, 1953; Lebowitz, 1963; and the book by Werner, 1948). The operation of Werner's developmental principle with respect to the evolution of perception is initially one of global "physiognomic" awareness. Here, the child attributes life-like characteristics to inanimate objects in his environment. This earliest form of perception is an affective-motor type. And the physiognomic quality of the object is experienced prior to any details of the object. At this stage, feeling and perceiving are poorly differentiated, as are imagining and perceiving.

As the child develops and begins to perceive forms, he sees them initially in a global fashion. The phenomenal world is perceived as diffuse rather than articulated, such that "parts are not distinguishable from the whole." The whole is a diffuse structure relatively uniform and homogeneous, one in which the parts have become more or less indistinct from each other. For example, Werner (1948) notes that children can recognize objects correctly without being able to point to the separate characteristics of the object, e.g., they can correctly identify a dog but cannot distinguish the animal's tail or leg. In addition to being undifferentiated, the child's primitive perceptual ability tends to be rigid rather than flexible and unstable rather than stable.

Perceputal organization, as development proceeds, becomes more stable. There is increasing ability to differentiate a relatively well-defined whole figure from the previously diffuse holistic organization. The outer contours of the figure are most readily apparent at this stage of development, and figure-ground relationships are no longer labile.

As the child continues to develop, further elaboration of the ability to differentiate wholes occurs. Awareness of the various component parts of the figure and that which was previously a well-defined whole figure is now perceived as a grouping of parts. This is the stage at which details are of great importance and the child is attracted to them as distinct entities rather than parts of a whole.

The last and most mature level in the development of perceptual ability is that stage during which the differentiated components of the figure are integrated into a well organized unitary figure. The child is still capable of differentiating parts from the figure, but these pieces are seen as components of a whole rather than as separate, fragmented elements.

Werner labels perceptual behavior prior to this mature level of development "primitive" to the extent that it lacks differentiation and hierarchization. Only at the terminal and most mature level of perceptual development can details be perceived without altering the gestalt of the whole figure. This totality, based on a stable organization of parts and holistic qualities of the stimulus, is hierarchically superior to any portion of the sensory data from which it is derived.

Thus, Werner's developmental theory of the ontogenesis of perception presents a sequence of perceptual development beginning with diffuse unstable structures and culminating in a well-integrated organization of sensory data. Werner (1948) states that the formation of percepts seems, in general, to proceed through an orderly sequence of stages. Perception is first global; whole qualities are dominant. The next stage might be called analytic (Bernstein, 1961); perception is selectively directed towards parts. The final stage might be called synthetic; details become integrated with respect to the whole. However, it must be noted at this point that Werner's theorization rests on a scaffolding of innate, genetic determinism. Further, at no point in his formulations does he present any age ranges when a particular stage or factor should have its onset--though the concept of hierarchical development is explicitly delineated. The net result appears to be a major assumption, on Werner's part, of vicissitudes in the child's developmental status with respect to visual perception solely as a function of time.

Piaget's Developmental Theory

The Cognitive Theory of Jean Piaget is primarily a theory of general intellectual processes (Flavell, 1963). Piaget believes that perception arises developmentally not as an autonomous mode of adaptation, but as a dependent subsystem within the larger context of an evolving sensory-motor intelligence. The foregoing account of the development of perceptual abilities is, therefore, a general description. Piaget (1929, 1950, 1951, 1952) and Inhelder and Piaget (1964) were the major sources for the ensuing delineation.

Maier (1965) notes that Piaget views general development as an inherent, unalterable process and, within this process, distinct phases can be witnessed. However, Piaget also describes perception as not being an innately fixed mechanism for registering stimuli, but as a developing system which becomes increasingly adaptive with age (see Elkind and Scott, 1962). What Piaget's reasoning implies is that there exists an absolute continuity of all developmental processes but that perception develops through a continuous process of generalization and differentiation.

The ontogeny of perception occurs as the infant strives for equilibrium between himself and the environment. This depends upon two interrelated Piagetian processes: assimilation and accomodation. Assimilation involves a person's adaptation of the environment to himself. Experiences are digested only as far as the individual can consolidate them in terms of his own subjective reality. Accomodation is the antithesis of assimilation. It is conceived as the impact of the environment upon the person. To accomodate is to incorporate environmental experience as it truly exists. As the result, perceptual phenomena are the product of a non-additive equilibrium [a system is non-additive or irreversible when the whole is more than the sum of its parts (Vurpillot, 1959)].

Two other terms require definition before the development of visual perception can be constructed--centration and decentration. Piaget defines centration as the set of relations perceived simultaneously from a particular point of fixation. The coordination between successive centrations constitutes decentration.

From birth through adolescence Piaget conceives of five major stages of development. The first state, from birth to approximately two years, is Sensori-motor. The infant starts with uncoordinated reflexes and leaves this stage with rudimentary remembering, planning, and imagining abilities. Minimal symbolic activity is also present. The

Pre-conceptual stage, from ages three to four, is the next phase of development. As yet the child cannot merge concepts of space, object and causality into temporal relationships. The child cannot differentiate his action from object action, i.e., the child is egocentric. It is here that the centration effect occurs yielding perceptions of gross quanity and form. In the intuitive phase, age 5 to 7, reasoning ability begins, but the child cannot think in terms of wholes, only parts. This inductive mode of thinking has its parallel in perceptual capabilities. Somewhere between the late intuitive phase and early phase of concrete operations (age 8-12), according to Piaget, decentration occurs. Thinking is now deductive. The child can organize wholes in an objective hierarchy. The last stage of development is the phase of formal operations which has no determinable effect upon the maturation of perceptual abilities.

In summary, Piaget's theorizing suggests a progressively more active and assertive role in the child's commerce with the environment, i.e., a gradual increase with age in the type of perceptual activity with consequent diminution in the force of centration effects. In this way there is a transition from the passive "centered" form perception of the young child to the active (decentered) perception of the older child.

Implicit throughout Piaget's writings is the theme of hierarchically ordering of skills with increasing complexity and differentiation as development evolves with the passage of time. For example, in the development of logic a three or four year old has no foresight or hindsight; by six years hindsight has developed, and by eight years foresight is apparent. This same sequence generally applies to the growth of causality, quantity, and justice. In addition to this hierarchical ordering, Piaget is firmly convinced that experience is a significant factor for the developing child. However, one of the most serious criticisms against his theorizations, this author believes, is the total inability of Piaget to specify what types of experiences are relevant and at what point in the course of development are they most significant. Certainly, any given set of stimulus conditions, cannot be beneficial in all areas of development, at any time, in the unfolding of development.

The theoretical formulations of Werner and Piaget have several commonalities. Both believe that perception initially is a passive, global and diffuse process that improves with time and further development. This improvement in perceptual abilities occurs in a more articulated, hierarchical manner via an orderly sequence of stages. However, it is at this junction that the postulates differ. Werner believes the ontogeny of perceptual capacities in an innate, genetic variable while piaget gives some credence to experiential processes. Werner, therefore, does not feel compelled to cite experiential factors in accounting for the enhancement of perceptual integrative functions. Piaget, on the other hand, to be internally consistant in his speculations, should specify the types and the frequency of experiential variables that produce improvement of this perceptual integrative capacity. However, nowhere in his prolific writings can such information be gleaned.

Attributes of Infant Vision

Although articulated perception develops through increased neurological maturity (Mussen, 1963), Gesell (1949) has shown that all the attributes of adult vision are integral parts of the infants' repetoire by the end of the first year. More specifically, coordination and convergence of the eyes, required for visual fixation and depth perception, begin to develop immediately after birth and are fairly well established by the age of seven or eight weeks (Mussen, 1963). Mussen, Conger, and Kagan (1963) also indicate that the young infant clearly differentiates a complex pattern array from a homogeneous one. Further, they believe the infant has an innate preference for such heterogeneous patterns. These studies would indicate, then, that investigations into visual perceptual abilities need not be directly concerned with physiological anomalies as long as developmental processes have not met with any severe debilitating trauma.

Studies of Visual Perceptual Judgments

The psychological literature over the past several decades contains a vast amount of evidence that perceptual judgments can be improved (Gibson, 1953a). However, no studies were found to consider the problem of perceptual integrative abilities. What is presented here is representative studies of perceptual judgments in children. Virtually all of these studies indicate that improvement was a function of age and/or time. For example, Wolinsky (1965) demonstrated that with an increase in age there is a concommitant decrease in the Muller-Lyer and vertical-horizontal optical illusions. Similarly, Witkin, et al., (1954) and Ghent (1956) utilizing embedded figure tests reported that children of 5 to 7 years of age had more difficulty than did children 10 to 13 years of age. They interpret these findings as indicating that increasing age increases the capacity to perceive a boundary as belonging to more than one figure. These results further suggest that the ability to differentiate the part from the whole continues to develop into adolescence. Schneyer (1958) and Lowe (1963) reach the same conclusion using a rotating trapezoid and rectangles of different shapes respectively.

Another main avenue for investigating perceptual judgments has been with the use of incongruent or inverted pictures. Bevan (1956) asked children from 4 to 7 years of age what they saw when viewing an incongruent photograph. The readiness with which the incongruity was reported was a positive monotonic function of chronological age. Similarly, Draguns and Multari (1961) noted that an inverse relationship existed between chronological age and the amount of cue accumulation required prior to the recognition of perceptually ambiguous stimuli. These findings have been consistently substantiated by other workers and demonstrate clearly improved accuracy of perceptual judgments with increasing chronological age (see Hunt, 1955; Gollin, 1965).

The literature relevant to perceptual judgments yields a consistent picture. A tentative law describes the relationship: ". . .with the progress of the child's development formal (relational) elements in his perception takes more and more predominence over material elements such as color" (Baley, 1948, p. 23). That is, with increasing age the child tends to differentiate stimuli in his environment. However, no attempts were made in these studies to control for previous experience. This would appear to be a serious methodological error. Similarly, no attempts were made to train, for example, a six year old child to make judgments like an eight year old child. Without investigating these two independent variables, any generalizations concerning chronological age and perceptual judgments appear to be only artifacts of existing developmental theory. Significant evidence, then, to establish or refute Baley's (1948) speculation has yet to be compiled.

Studies of Visual Perceptual Integration Using Rorschach Developmental Scores

It has long been recognized that the organizing aspect of the perceptual process becomes more apparent when dealing with ambiguous perceptual material (Phillips and Framo, 1954). Perhaps the best sources of stimulation for such perceptual studies are the ten Rorschach inkplates. Rorschach (1942) stated that the inkplates ". . . could be called a test of the perceptive power of a subject." (p. 18). Further, he writes that "the interpretation of these chance forms falls in the field of perception rather than imagination" (p. 18). Therefore, it seems plausible to assume that the Rorschach inkblot could be utilized as an adequate measure of perceptual development. Thorpe and Schwartz (1965) and Phillips, Kaden, and Waldman (1959) have indicated that a systematic body of data exist supporting the validity of various Rorschach measures as perceptual indices of development.

Friedman (1950) devised a developmental scoring system based on the work of Dworetzki (1939) for use with the Rorschach inkplates. The system is an adjunct to location scoring and is a representation of the structurel aspects of the percept. Using this system Friedman (1952, 1953), Siegel (1953), and Hemmendinger (1953) have examined the perceptual integrative abilities of children. Their results indicate that the younger child's integrative capacities could be characterized as predominantly global and diffuse and marked by a relative dearth of differentiation and hierarchic integration. By age 9 there is a definite shift in perception. Here, for the first time, as in adult Rorschachs, subjects see more details than global, diffuse wholes (see Ames, Learned, Metraux, and Walker, 1953). Specifically, the following relationships were observed between chronological age and the distribution of location choices: The 3 year olds are whole perceivers; they see few details and their perception is best described qualitatively as immature and undifferentiated. However, by age 4 or 5 the structure of perception has shifted. They perceive less in terms of wholes and frequently notice and comment on the parts. By five years there is an increased interest in detailing the environment, although the children are not markedly more mature in relation to the quality of perception. By five years another distinct change occurs. Without a corresponding increase in the number of responses, there is an abrupt and marked augmentation to tiny and rarely noticed areas of the blots. These children are so involved with minute details that are not integrated into larger wholes, but are seen in isolation. This characteristic continues through ages 7 and 8, always at the expense of the work of integrating all parts of the blot into an all-encompassing percept. When wholes are eeen, they are elucidated by a listing of parts, rather than an integrated entity. It is, according to these authors, characteristic as the child matures chronologically from age 3 to 8, that the proportion of percepts scored developmentally mature are on the ascendancy.

The distinguishing trademark of the 6 to 8 year olds, then, is the proportionate part played in their perceptual behavior by analytic operations (Hemmendinger, 1953). In reacting to the larger details of the environment these children often synthesize parts into wholes, but by and large their perception reflects analysis without appropriates integration. It is not until the child is nine or ten that the synthesis of large details are integrated into larger percepts. Bernstein (1961) found supportive evidence when he examined perceptual primitiveness as a function of age.

That is, an inverse relationship between age and primitiveness of response was reported. Further, a high correlation was discovered between primitive responses and 6 year olds, while no such relationship was found for the 9-year-old or 12-year-old groups.

The general trend of development appears straightforward. With increasing chronological age there is a decrease of the undifferentiated, diffuse whole and detail responses, an increase of the highly articulated, well-integrated whole and detail responses, and a peculiar shift from the early whole responses toward small details between the ages of six to eight years, then declining in favor of the integrated whole responses of the nine or ten year old (Hemmendinger, 1960).

This sequence, then, appears to have theoretical implications. As Hemmendinger (1953, p. 164) writes:

> In the progression of development the sequence is from a global, diffuse, undifferentiated stage through a differentiated and discrete stage (analytic), to a level of hierarchically integrated and articulated performance and functioning (synthetic).

This transformation appears to be initiated at about age two and one-half to three and is in its terminal stage about age ten. Attempts to integrate these results within a theoretical framework finds validity in the writings and the formulations of both Piaget and Werner. However, the review of literature failed to discover any relevant studies to test specifically the validity of their developmental constructs or examine any experiential or training effects. That is, studies to date have been concerned with the integrative capacities of a child of six or eight; but no attempts to explore the feasibility of enhancing the developmental trend by specific manipulations of stimuli has been forthcoming.

The Deprived Child

In recent years great interest has focused upon the culturally deprived child. However, a search of the literature revealed no relevant investigation into the perceptual abilities or integrative capacities of a child with less than middle socio-economic standing. Similarly, no research has been reported to indicate the status of developmental theory when applied to the deprived child (Werner's and Piaget's formulations were based on observations and experimentation of children of middle-to-upper socio-economic levels). In lieu of relevant investigations what will be presented here is a brief delineation of the culture of the deprived child.

The culture of poverty, according to Deutsch (1962), provides a minimum range of stimulation and of opportunity to manipulate objects or to experiment with them in an orderly manner. The result is a restriction in the variety of sensory imput that produces a reduction in the precision and ability to perceive relationships or other abstract qualities such as size, shape, time, and distance. This lack of mediation, in addition, reduces the opportunity to link experiences together in meaningful, integrated ways (Taba, 1964). It appears obvious, then, that the cognitive aspects of a child's perceptual experience in this low socio-cultural system cannot be completely truncated from the perceptual world of objects (see Hollowell, 1951). That cultural deprivation engenders perceptual deprivation cannot be underemphasized. For the deprived home is a home where intellectual endeavours are not encouraged or reinforced; it is a home that is not verbally oriented; it is a home that stifles creativity; and it is a home caught in the past or future (Deutsch, 1963; 1966; Haggstrom, 1965; Anderson and Anderson, 1961). These factors appear to be self-evident and logical justification for a reevaluation of developmental theory and perceptual integrative abilities.

Summary and Conclusions

Theoretically, the Genetic Theory of Hienz Werner and the Cognitive Theory of Jean Piaget have been interpreted in terms of an increasing subordination of immediate perceptual impact of the environment to a more abstract and integrated scheme (Feffer, 1959). That is, initially, visual perceptual abilities are diffuse and poorly articulated, while the child remains a passive recipient of stimulation. As the child develops, he becomes increasingly aware of his environment and is perceptually active. Further, he is now able to articulate and integrate, in a hierarchical fashion, perceptual stimuli. The theories become divergent at this point, since Werner believes the ontogeny of development is an organismic variable (nativism) while Piaget gives credence to experiential variables (empiricism).

Research in the field of infant behavior indicates that physiological development of the visual system is not a crucial factor in perceptual integrative abilities of the child.

A search of literature proved fruitless for studies relevant to examining major developmental constructs as they are related to visual integration. Further, studies investigating cultural and training effects upon visual integration were similarly not forthcoming. However, from the articles cited evaluating the perceptual judgments and integrative capacities of children the following conclusions may be drawn:

1. Perceptual accuracy can be improved with training. The older child is less rigid and more accurate prior to training than the younger child.

2. There is a maturity of visual integrative capacity ranging from the global ability of the three year old through the transition period of the six year old who perceives tiny details at the expense of well-defined wholes, to the well-articulated perception of the ten year old.

3. No studies have been executed to determine whether a younger child could be perceptually trained, thereby accelerating his integrative ability.

4. No researcher has sought to discover what kinds of experiences would be necessary to enhance the perceptual integrative capacities of the child.

5. Those studies that do examine perceptual attributes of children implicitly or explicitly accept, without reservation, the postulates of current developmental theory.

CHAPTER II

STATEMENT OF THE PROBLEM

The present study is an attempt to focus specifically on the development of visual integrative abilities in children. Ample evidence exists to indicate that visual perceptual integrative functions are markedly divergent with respect to the chronological age of the child. However, it will be remembered from the previous chapter that no investigations have been undertaken to examine the development of this capacity specifically.

This study is proposed with the hope of investigating the effects of environmental stimulation and training upon the "normal" sequence of organizing and integrating the visual perceptual world. The results of such a procedure might have direct implications in the areas of developmental theory and in the education of primary school children.

This author believes that psychologists have an obligation to scrutinize carefully theoretical issues and their implications, for it is within this framework, many times, that remedial programs are conceived. This is the focus of the present study. While it is essentially an exploratory investigation, some hypotheses may be made:

1. The developmental sequence for perceptual integrative abilities can be accelerated with training.

2. Training will be more effective with children from a home environment of diverse stimulation and less effective with children from a stilted home environment.

3. A "rich" environment will be more conducive to integrated perception than a "deprived" one. That is, experiential factors are a significant aspect of this development.

4. With respect to the relative effectiveness of training, the specificity of the training task will be a significant factor in the post-training test of ability to perceptually integrate in a hierarchic manner.

CHAPTER III

METHOD AND PROCEDURES

Subjects

Sixty first grade boys between the ages of six and seven, enrolled in the Knox County School System served as subjects. Boys were selected over girls since some authors have noted sex differences in perceptual tasks, i.e., males perceptually integrate less adequately than females of the same age (Rose and Stavrigivos, 1943). Therefore, the effect of training should be more apparent in boys. All of the boys used in this study qualified by meeting two criteria. First, all subjects had at least Dull-Normal intelligence as reflected in the Peabody Picture Vocabulary Test (see Dunn, 1959) and secondly, each boy came from either a deprived or enriched home environment. Usually, these discriminations were made utilizing criteria suggested by Gray and Klaus (1965), i.e., parental education less than 8 years, unskilled or semi-skilled labor, no books or magazines in home. If these were inappropriate, school records and teacher ratings were used in making a particular decision. Once selected as having an enriched or deprived background, each boy was randomly placed into one of three experimental conditions.

Materials

Ten of the Holtzman inkplates (see Holtzman, Thorpe, Swartz and Herron, 1961) and a series of ten sets of contour line drawings constructed by Gollins (1960) served as training stimuli. The drawings were of animals such as a dog or a cat. Each set of pictures of a particular animal had five separate drawings; each picture having more internal and external lines than the preceding one to more complete the likeness of the animal. For each one of the Holtzman plates responses that were representative of integrated responses to perceptually ambiguous stimuli were devised by the experimenter. Each of these mature whole responses (W++, W+, Wm) occurred an equal number of times for every subject in this condition (See Appendix A). Similarly, for each of the ten sets of contour line drawings, plates were chosen ranging from few lines to many lines, the fewer lines requiring more integrative capacity than many contour lines (see Appendix B). In this manner, each training condition received fifteen training stimuli. Within each training condition the

training stimuli were presented randomly. Rorschachs were administered in every condition to conclude an experimental session for each subject.

Procedure

Each child was brought individually by the experimenter to the examining room. If he was in the Holtzman training condition the following directions were administered:

> We are going to play a game called, "What do I see?" I'm going to show you some pictures and tell you what I see. Then I'm going to show you some more pictures and you tell me what you see. OK? Let's start.

Each one of the Holtzman plates was shown to the child and the experimenter explained to the subject what he saw. When the series was completed, the experimenter indicated it was the subject's turn to tell what he saw and the following directions were given prior to the administration of the Rorschach:

> I have some cards here with pictures on them. Can you tell me all the things it looks like?

If one response was given to a card, the subject was encouraged to tell what else it could look like. The inquiry was taken immediately after the free association to each card. Such a modification was felt necessary if a scorable

protocol was to be obtained (after Friedman, 1950).

If a subject was assigned to the contour line group, the following set of directions was given:

> We are going to play a game called "What's that?" I'm going to show you some pictures with lines on them and you tell me what the lines could be. Here is the first one.

If the child could not delineate what the lines represented, the experimenter told the subject what the picture was supposed to be. When the series was completed, the Rorschach was administered as outlined above.

If a child was assigned to a control group, the experimenter spoke to the subject about school activities, then administered the Rorschach.

Each child, whether assigned to a training or control group, did not have the Rorschach administered until 12 or 15 minutes had lapsed since the start of the experimental session.

Each protocol was tape recorded verbatim and then transcribed. Following the transcription each protocol was scored developmentally according to the definitions of Friedman (1950).

Developmental Scoring Criteria

The methodology utilized by Dworetzki (1939) and adapted by Friedman (1950), in which the Rorschach inkplates were used as an index of perceptual integration readily lent itself to this investigation. The following definitions are necessary in order to score a response developmentally:

W++: Scored on an unbroken blot; a response in which a unitary blot is perceptually articulated into a well-differentiated unifying whole; the specific form matches the blot.

Ex: Card I. "Can imagine it's a fountain with two dogs on each end. . . "

W+: A response in which all the discrete portions of a broken blot are combined into a unifying whole and in which the specific form implied in the content matches the blot.

Ex: Card II. "Two fellows at a bar toasting each other."

Wm: A response in which the gross outline of an unbroken blot is taken into account so that the specific form implied in the content is adequate to the blot, i.e., is scored F+.

Ex: Card V. "A bat."

Wv: A response in which there is a diffuse general impression of the blot. Although some form element is present, it is of such an unspecific nature that almost any perceptual form is adequate to encompass the content. The essence of this type of response is that it may be given to any blot or any part of a blot area. The form requirement is usually plus, but occasional minuses, based on frequency of occurrence, may also be produced.

Ex: Card II. "Rock formation."

W-: A response in which the content produced requires a definite specific form, which, however, is not provided in the blot.

Ex: Card IV. "A starfish."

Wa: A response in which the shape of the blot plays no determinable role. Such responses are based solely on chromatic or achromatic aspects of the blot, and, no form element would be included in the score.

Ex: Card VIII. "Rainbow."

The criteria for the W responses apply to the D responses, except, of course, that the blot area referred to is a usual detail. Consequently, with the exception of the D+ response which requires a modified definition, only examples for the D scores will be provided:

D++: Ex: Card IX. Orange area designated as a man, with hat, blowing a bugle.

D+: A response in which two or more discrete blot areas (two or more D) are combined into one percept, the specific form of which matches the blot.

Ex: Card III. All black areas. "Two men beating drums in a tribal dance."

Dm: Ex: Card III. Center red area, "Suggests a bow tie."

Dv: Ex: Card IX. Large green area, "Looks like a map of some sort.

D-: Ex: Card VIII. Side pink areas, "That's a bee."

Da: Ex: Card II. Top red area, "Fire."

A "broken" card is considered as one in which white background isolates the majority of a usual detail from the remainder of the blot, or where a major portion of white background intervenes between the two lateral halves of the total blot. Therefore, cards I, IV, V, VI, and IX are considered unbroken and cards II, III, VII, VIII, and X are considered broken. It should be noted then, that although Wa, Wv, W- can occur on all cards, Wm and W++ can occur only on unbroken cards and W+ scored only on broken cards. Although normally card VII cannot yield a Wm score, it has been found necessary to allow certain few exceptions. This card produces, in a few cases, relatively clear-cut "schematic" W responses in which the perceptual functioning is governed solely by a general contour feature of the blot, as its "U" shape. Such W responses, as "harbor," "bridge," "bowl" are scored Wm, for it is felt that the gross outline of the contour is clearly involved, rather than any true integration of discrete portions (Hemmendinger, 1960). Those scores of ++, +, and m reflect developmentally mature and integrated perceptions, while scores of v, -, and a reflect a developmentally immature and diffuse percept.

One final word must be mentioned concerning the reliability of these developmental scores. Friedman (1953), Siegal (1953) and Hemmendinger (1953) report interscorer agreements ranging from a low of 89.7 to a high of 95.5 per cent. For the present study Dr. Friedman has consented to function as reliability measure for the developmental scoring.

CHAPTER IV

RESULTS

Initially, ninety-six boys were screened with the Peabody Picture Vocabulary Test. Of these, fourteen were deleted because they did not meet the criterion of, at least, Dull-Normal intelligence. The remaining eighty-two boys were assigned to their respective socioeconomic standing. Thirty-five were designated deprived, while forty-seven were assigned to the enriched category. Twelve boys were randomly assigned to each of the six groups: enriched Holtzman, enriched contour line, enriched control, deprived Holtzman, deprived contour line, and deprived control. Two extra subjects were available for each treatment group in case any subject had to be dropped from the study due to his not meeting the minimal criterion of ten responses on the dependent measure. One subject was deleted from the enriched Holtzman, deprived Holtzman and deprived control group for this reason.

The data for each subject was converted into three scores. The first conversion was the proportion of whole responses to the total number of responses (W/R). The second was the ratio of mature, whole responses to total responsivity (WMAT/R). And the third was the proportion of integrated, whole responses (W+, W++) to the total number of whole responses (WI/WMAT). These transformations were necessary in order to control the individual variability with respect to the total productivity of each subject used in the study.

A random sample of responses from all subjects was drawn. These were then scored independently by a psychologist using the developmental scoring system. A reliability coefficient was then calculated comparing this scoring with the author's scores. The resultant coefficient was .902.

A 2 x 3 factorial analysis of variance was computed for each of the variable a Pearson-product moment correlation was calculated with mental age. Mental age was utilized rather than I.Q. because the screening instrument was more sensitive to individual differences of the subjects using this test parameter. The resultant correlation coefficients are presented in Table I. It may be seen that none of the coefficients were significant ($p > .05$). Because of the nonsignificance of mental age, no analyses of covariance were deemed necessary.

TABLE I

CORRELATION COEFFICIENTS OF MENTAL AGE WITH W/R, WMAT/R, AND WI/WMAT

	Mental Age	p
W/R	.024	>.05
WMAT/R	.156	>.05
WI/WMAT	.235	>.05

The results of the analysis of variance of W/R are summarized in Table II. Differences with respect to treatments were highly significant ($p < .001$) while socioeconomic class and treatment x socioeconomic class interactions were not significant ($p > .05$). The means and standard deviations for each treatment group are presented in Table III. Duncan's Multiple Range Tests were performed on the treatment effects and significant differences at the .01 level were found. The Holtzman training condition was superior to the contour line training and the control groups.

The results of the analysis of variance for WMAT/R are summarized in Table IV. It may be seen that socioeconomic class standing and interaction of social class and treatments were significant at the .05 level, while treatments were highly significant ($p < .01$). The means and standard deviations for socioeconomic class, treatments and interaction are presented in Table V. Duncan's Multiple Range Tests were performed on all means. The enriched environment was significantly different from the deprived socioeconomic class at the .01 level. The Holtzman treatment group was superior to the contour line and control groups ($p < .01$). The results of the interaction significance test are

TABLE II

SUMMARY OF ANALYSIS OF VARIANCE FOR W/R

Source	df	Sum of Squares	Mean Square	F
Socioeconomic Class	1	29172.1496	29172.1496	0.857
Treatments	2	890155.0208	445077.5104	13.078*
S x T	2	120918.6992	60459.3496	1.776
Error	54	1837822.2848	34033.7460	
Total	59	2878068.1472		

*$p < .001$.

TABLE III

SUMMARY OF TREATMENT MEANS AND STANDARD DEVIATIONS FOR W/R

	Mean	Standard Deviation
Holtzman	544.750	199.64
Contour Line	336.200	288.75
Control	255.750	111.55

TABLE IV

SUMMARY OF ANALYSIS OF VARIANCE FOR WMAT/R

Source	df	Sum of Squares	Mean Square	F
Socioeconomic Class	1	125035.3488	125035.3488	6.000*
Treatments	2	488184.1280	244092.0640	11.712**
S x T	2	240724.7968	120362.3984	5.775*
Error	54	1125403.8784	20840.8126	
Total	59	1979348.1472		

*$p < .05$.

**$p < .01$.

TABLE V

SUMMARY OF SOCIOECONOMIC CLASS, TREATMENT, AND INTERACTION MEANS AND STANDARD DEVIATIONS FOR WMAT/R

	Mean	Standard Deviation
Socioeconomic Class		
Enriched	280.033	206.24
Deprived	188.733	146.31
Treatments		
Holtzman	358.850	196.34
Contour Line	196.350	182.04
Control	147.950	82.42
Interaction		
Enriched Holtzman	493.300	183.27
Enriched Contour Line	207.800	126.52
Enriched Control	139.00	95.00
Deprived Holtzman	224.400	87.31
Deprived Contour Line	184.900	231.65
Deprived Control	156.900	71.68

presented in Table VI. It may be seen that the enriched Holtzman group performed better than any other group.

In Table VII, the results of the analysis of variance for WI/WMAT are summarized. Socioeconomic standing and interaction of treatments and environment were significant at the .01 and .05 level respectively. Treatment conditions were, also, highly significant ($p < .001$). The means and standard deviations for socioeconomic class, treatments and interactions were calculated and are noted in Table VIII. The results of Duncan's Multiple Range Tests indicated that an enriched environment was superior to a deprived milieu. The Holtzman training group, also, performed better than the contour line and control group ($p < .01$).

In Table IX the results of the interaction significance tests are presented. It may be seen that the enriched Holtzman group was superior to the other groups at the .01 level of significance, though not statistically significant.

It may also be noted that in the WMAT/R, WI/WMAT and W/R analyses, the predicted trend was demonstrated. That is, each analysis indicated that the contour line group was superior to the control group.

TABLE VI

DUNCAN'S MULTIPLE RANGE SIGNIFICANCE TEST FOR INTERACTION OF WMAT/R GROUPS

EH*	ECL	EC	DH	DCL	DC

$p < .01$

*EH = Enriched Holtzman

ECL = Enriched Contour Line

EC = Enriched Control

DH = Deprived Holtzman

DCL = Deprived Contour Line

DC = Deprived Control

Interpretation: Any two treatment groups underscored by the same line are not significantly different. Any two treatment groups not underscored by the same line are significantly different.

TABLE VII

SUMMARY OF ANALYSIS OF VARIANCE FOR WI/WMAT

Source	df	Sum of Squares	Mean Square	F
Socioeconomic Class	1	343224.0640	343224.0640	11.582**
Treatments	2	609101.7216	304550.8608	10.277***
S x T	2	264841.7280	132420.8640	4.469*
Error	54	1600217.3824	29633.6552	
Total	59	2817384.8832		

*$p < .05$.

**$p < .01$.

***$p < .001$.

TABLE VIII

SUMMARY OF SOCIOECONOMIC CLASS, TREATMENT, AND INTERACTION MEANS AND STANDARD DEVIATIONS FOR WI/WMAT

	Mean	Standard Deviation
Socioeconomic Class		
Enriched	227.011	242.73
Deprived	75.833	162.48
Treatments		
Holtzman	293.200	240.76
Contour Line	93.300	175.87
Control	67.900	165.32
Interaction		
Enriched Holtzman	461.400	168.07
Enriched Contour Line	136.600	190.08
Enriched Control	83.000	179.97
Deprived Holtzman	125.000	176.78
Deprived Contour Line	50.000	158.11
Deprived Control	52.500	157.43

TABLE IX

DUNCAN'S MULTIPLE RANGE SIGNIFICANCE TEST FOR INTERACTION OF WI/WMAT GROUPS

EH*	ECL	EC	DH	DCL	DC

p < .01

*EH = Enriched Holtzman

ECL = Enriched Contour Line

EC = Enriched Control

DH = Deprived Holtzman

DCL = Deprived Contour Line

DC = Deprived Control

Interpretation: Any two treatment groups underscored by the same line are not significantly different. Any two treatment groups not underscored by the same line are significantly different.

CHAPTER V

DISCUSSION

The ontogeny of visual integrative abilities has been accorded an uncritical acceptance. However, the results of the present study strongly suggest that visual integrative functions need to be carefully scrutinized. In general, the present study indicated that socio-economic standing and specific types of training experiences are relevant factors in the development of visual integrative abilities. Further evidence supporting the proposition that the developmental sequence for perceptual integrative capacities could be accelerated by training was evinced.

Interaction Effect

Many authors have commented upon the problem of the disadvantaged or deprived child (Taba, 1964; Deutsch, 1963; 1964; 1966; Haggstrom, 1965). Their conclusions have been unanimous. Cultural deprivation has been construed as a failure to provide for the infant and young child the experience for the adequate development of cognitive processes.

The results of this study strongly support this proposition.

The lack of any significant interaction effect in the W/R analysis was not totally unexpected. The differences and dearth of articulation of percepts would not be reflected in this analysis because W/R, it will be recalled, only measures whole responses as a proportion of total responsivity and does not yield any information about perceptual organization of the whole responses. However, both the WMAT/R and WI/WMAT analyses and the subsequent Duncan's Multiple Range Test supported the second hypothesis described earlier. That is, specific training in perceptual organization will be more effective with children from a home environment of diverse stimulation and less effective with children from a stifled (deprived) cultural environment. With both measures, children from "enriched" backgrounds, exposed to the Holtzman training condition performed superior to any of the other treatment-social class combinations.

These results suggest, then, that the disadvantaged child's visual perceptual abilities are primitive, poorly articulated and diffuse when compared to his counterpart from an advantaged cultural environment in terms of his ability to benefit from specialized training. Past experience, particularly conceived in a simple reinforcement paradigm, appears to adequately account for this difference. For example, Bruner and Postman (1949b; 1951) have noted that past experience is normally among the first determinants utilized in forming initial hypotheses about the perceptual world. Gibson (1953a) and Solley and Engel (1960) have pointed out that as experience with perceptual stimuli occurs, differential reinforcement is required to organize the perceptual field and enhance the specificity of perception. In relation to the disadvantaged child, the home environment is not conducive to the reinforcement of creative or inquisitive endeavor; and is not oriented toward active perceptual organization on the child's part. Deutsch (1965) summarizes the plight of the deprived child when he writes:

> Visually, . . . its overcrowded apartments offer the child a minimal range of stimuli. There are usually few if any pictures on the wall, and the objects in the household, be they toys, furniture, or utensils, tend to be sparse, repetitious, and lacking in form and color variations. The sparsity of objects and lack of diversity of home artifacts which are available and meaningful to the child, in addition to the unavailability of individualized training, gives the child few opportunities manipulate and organize the visual properties of his environment and thus perceptually to organize and discriminate the nuances of that environment. These would include figure-ground relationships and the spatial organization of the visual field. The sparsity of manipulatable objects probably also hampers the

> development of these functions in the tactile area. For example, while these children have bromsticks and usually a ball, possibly a doll or a discarded kitchen pot to play with, they don't have the different shapes and colors and sizes to manipulate which the middle-class child has in the form of blocks which are bought just for him, or even in the variety of sizes and shapes of cooking utensils which might be available to him as playthings (pp. 358-359).

Thus the net product of this dearth of rewarding experiences is a primitive, undifferentiated, passive individual with respect to visual perceptual integrative abilities.

This perceptual integrative deficiency has ramifications in the school situation. The deprived child, being unable to respond appropriately to perceptual training because of inadequate stimulation and reinforcement at home, may not develop the necessary perceptual organizational skills by the time he enters the first grade and this may contribute to the frustration these children feel upon entering school. The results of the present study would indicate that reading and writing difficulties are more prevalent in the disadvantaged child than in his counterpart from an "enriched" environment. This speculation is consistent with the work of Vernon (1958) and Wolinsky (1965) who found that developmental lags in perceptual abilities are conducive to learning disabilities. Similarly, Koppitz (1964) reported that children who have perceptual deficits have concomitant low achievement scores in basic reading and arithmetic skills. Ilg and Ames (1965) have voiced great concern over the concept of school readiness. Their contention is that without minimal overall development, including perceptual abilities, the child cannot adequately perform in the classroom situation. However, in their sampling to obtain normative data, no deprived children were utilized. Goldberg (1963) has, however, indicated that the deprived child generally meets with academic frustration almost immediately after entering the schoolroom. These results and the present study seem to suggest that cultural deprivation leads to perceptual deficits which may produce learning disabilities.

Although the "critical period" concept has not been clearly established with human beings, it may be a fruitful postulate to utilize when discussing the difficulties encountered by the deprived child. Attempts at stimulating disadvantaged children have been equivocal, e.g., Head Start. A possible explanation is that too little was attempted too late. By the time a child reached age 5, his manner of responding to novel situations and his expectations may be sterotyped. Fantz (1965) has suggested such a critical period for visual capacities. Chilman (1966), also, gives credence to this proposition, when he discovered that infants from deprived areas do not receive a wide range of visual experience when compared to their "enriched" counterparts. Further support for the early critical period concept comes from the work of Bandler (1965). He initiated an intensive pre-school program for three year olds but had only limited effectiveness with disadvantaged children. A possible reason for his results may be that the intervention was started within a developmental framework, too late, for Hunt (1964) notes that deprived infants are not significantly different from other infants until about eighteen months of age, and the deprived child starts to show developmental retardation in the second year of life. The critical period, if it can be called such, appears to fall approximately between the ages of eighteen months and two years. During this period, reward for active commerce with the environment is crucial for the development of perceptual integrative functions (Bruner and Postman, 1949a).

In summary, then, the present study indicates that the deprived child between six and seven years of age cannot adequately profit from experience and training with perceptual material like his "enriched" counterpart. The "deprived" child, by virtue of his unique background enters a learning situation with a set that is not conducive to learning (Dennis, 1951). Indeed, the reward and punishment contingencies in his cultural milieu are such that active mastery of novel situations and abstract organization of stimuli are discouraged (Riessman, 1962). It is not, therefore, surprising that "deprived" children enter this learning situation with an armamentarium inadequate to cope with the task at hand.

The present study seems to make it clear that these children possess a perceptual diffuseness characterized by poor organizational articulation that is not amenable to specific training of a short duration.

Conversely, the child from an "enriched" cultural environment has been submitted to a broad band of stimulation permeating all the senses. They have been rewarded for novel endeavors and for pursuing the answers to their questions. Further, these children have been exposed to books, pictures and colors. It is in this atmosphere that perceptual integrative abilities are engendered and encouraged. And, it is because of this background that specific perceptual integrative training was fruitful in the present study.

Causal factors may be attributable to a lack of stimulation and reinforcement for perceptual organizational endeavors. But, more basic to this discussion is that this debility continues into the school room and produces early frustration in the learning situation. The concept of critical periods may account for this perceptual integrative deficiency, based on the hypothesis that proper rewarding experiences were not forthcoming during a crucial period in the ontogeny of visual integrative functions; thus producing a marked perceptual disorganization. A researchable solution is tentatively offered: a rigorous program of diverse cultural stimulation and reinforcement for such endeavors beginning quite early in the child's life if he is going to be able to compete with his contemporaries from an "enriched" environment. For, as Clarke and Clarke (1959) have shown, damage at one stage of development will be reflected subsequently in later stages.

Effects of Training

Examination of the treatment effects for the analysis of variance with the three variables W/R, WMAT/R, WI/WMAT indicate that there was a differential effect from the type of training upon perceptual integrative capacities. With all three variables, Holtzman training was superior to the contour line training condition and the control group ($p<.01$). These findings give credence to the fourth hypothesis stated earlier, i.e., the specificity of the training task will be a significant factor in the post-training test of the ability to perceptually integrate in a hierarchic manner. A possible explanation for this effect is that the types of functions sampled with the Holtzman training task closely paralleled the activity on the part of each boy on the dependent Rorschack measure. That is, each subject was required to actively organize perceptually ambiguous stimuli. However, the task of each child with the incomplete contour line drawings required much less perceptual integrative activity on the part of the subject. These subjects had only to close a gestalt and guess the animal depicted. This particular type of perceptual activity, obviously, did not have a close analog on the dependent measure. Thus the predicted results were obtained and attributable to the differences with respect to organizational activity level required for each training condition.

It is particularly interesting to note that the contour line drawings condition, actually forced the subjects to formulate only whole perceptions, but this training did not significantly augment whole productivity (W/R) on the dependent measure when compared to the no treatment condition. The most parsimonious conclusion to be drawn is that this type of training is futile in producing whole, mature, hierarchically integrated perceptions with ambiguous stimuli. That contour line training is not superior to the control condition in the establishment of perceptual integrative capacities strongly supports the supposition concerning the relationship of training to the criteria measure. Therefore, at least one generalization seems obvious: in such learning situations, the end results or goals must be clearly delineated before appropriate training techniques can be applied. Without such specificity of objectives, adequate training measures cannot be determined.

Socioeconomic Class Effect

While there were no differences with respect to the production of whole responses as a proportion of total responsivity (W/R), there were highly significant differences with the ratios of mature whole responses to total responsivity (WMAT/R) and integrated whole responses to mature whole responses (WI/WMAT) ($p < .001$ and $p < .01$, respectively). This seems to suggest a difference in basal performance level between the two socioeconomic groups in relation to perceptual skills. Further support for this supposition, is gleaned when the scores of the EC and DC groups are examined. Although the difference between the EC and DC groups is not statistically significant, the predicted trend was found. This trend would appear to be consistent with the preceding discussion.

Implications for Developmental Theory

The data delineated in the present study tends to support all of the hypotheses generated earlier in this paper. Of particular importance here is the evidence indicating that perceptual integrative abilities can be improved with training and that the training will be more effective with children from an "enriched" environment. These results have direct ramifications in current developmental formulations of both Jean Piaget and Hienz Werner.

Piaget's theorizing has been called a logical theory of perception (see Elkind and Scott, 1962). Piaget describes the development of perceptual abilities through a series of steps using the concepts of centration, decentration, and differentiation. The theory espouses a gradual increase, with chronological age, in the child's activity and commerce with the environment; ultimately leading to a diminution in the power of centration effects. This in turn, according to Piaget, produces hierarchically ordered whole perceptions culminating somewhere between the eighth and twelfth year.

Virtually all of the research with perceptual judgments supports this type of theorization (see Witkin _et_ _al_., 1954; Ghent, 1956; Lowe, 1963). The studies by Friedman (1952), Siegel (1953), and Hemmendinger (1953) using Rorschach developmental scores have found essentially the same relationship. That is, as the child matures, specific changes in his perceptual abilities occur; these abilities are transformed from the non-differentiated diffuse perceptions to hierarchically, mature integrated perceptions. However, as Wohlwill (1962) has pointed out, Piaget tends to ignore the effects of antecedent conditions and environmental variables in favor of an unfolding internal sensori-motor structure.

That is not to say that Piaget totally overlooks the effect of experience, but he does not stipulate the nature of the experience nor meaningfully integrate them into his postulates. It appears that when Piaget speaks of experience, he is referring only to maturation (Maier, 1965). Vernon (1960) has promulgated this line of theorization one step further; he believes that direct teaching cannot cause a child to go beyond the stage he has reached through natural maturation.

The results of the present study appear contradictory to this line of thinking. There is ample evidence in the present study that perceptual integrative abilities can be accelerated by training, if the child has in his repertoire certain classes of reinforcing experiences. Bevan (1961) suggested that proper language development is one crucial type of experience necessary for perceptual development. Piaget, working solely with children from what this study has been calling "enriched" backgrounds, failed to recognize specific socioeconomic differences. For example, Chilman (1966) has pointed out that "deprived" children are distrustful of new experiences and are severely lacking in visual stimulation from early infancy. It would seem, therefore, that even though Piaget's work spans forty years, he has not shown the maturational influence to be the sine qua non of perceptual development. Neither can it be entirely negated (after Ojemann and Pritchett, 1963). This study has demonstrated that cultural backgrounds have a significant debilitating or enhancing effect on the development of perceptual integrative abilities. Yet to be determined is the nature of the experience that Piaget pays lip service to, for such understanding might ultimately demonstrate that a child may be accelerated through or omit developmental stages in the Piagetian scheme as he proceeds toward hierarchic visual organization. This study has taken the initial step toward that final understanding.

Along these lines, one further point seems worthy of comment. Piaget believes the development of perceptual abilities is not an autonomous mode in and of itself, but exists as a kind of dependent subsystem within the larger context in the evolution of sensori-motor intelligence (Piaget and Inhelder, 1959). It will be recalled that the correlation between mental age and the perceptual integrative measures were not significant ($p > .05$). The present study, therefore, negates the veracity of this supposition. The speculation that appears self-evident is that intelligence and perceptual capacities are more autonomous than Piaget believes, at least, for measured intelligence quotients equal to or greater than eighty. However, this supposition and its ramifications should be further explored in the context of independent ontogenies of intellectual and perceptual integrative functioning.

Within the framework of Werner's hypothesizing commonalities may be found that parallel Piaget's postulates. Both men give credence to the belief that perceptual development is characterized along a continuum of increasing differentiation and integration. Werner (1948, 1957), however, epitomizes the nativistic approach to the ontogeny of visual integrative abilities. The three general stages that he outlines were not supported by this study. Perceptual integrative abilities, it has been shown, can be accelerated by training, thus the scaffolding of innate, genetic determinism seems of questionable validity. Further, the cultural differences noted earlier cast even more doubt on the concept of the nativistic approach to perceptual integrative development.

In summary, then, the present study raises questions that have apparently been overlooked by the developmental theorists, Piaget and Werner. The ramifications that both training and socioeconomic standing have upon the theoretical ontogeny of visual integrative capacities cannot be ignored. The studies of perceptual judgments and perceptual developmental trends as indicated on the Rorschach have grossly overlooked these variables. These studies have indicated a monotonic relationship between age and perceptual accuracy and a lack of hierarchic integration of ambiguous stimuli until approximately 9 to 12 years of age. This study, however, has adequately demonstrated that these findings must be tempered with a cognizance of experiential factors and the kinds of reinforcement that are a function of various sub-cultures. The findings of the present study, for example, demonstrated that a 6 year old child from an "enriched" background could, with specific training, perceptually integrate ambiguous stimuli as adequately as a nine year old child in the Hemmendinger (1953) study. In order to account for these differences two concepts have been invoked. The first was the diverse stimulation and reinforcing experiences that differentiate the "enriched" and the "deprived" child. Critical periods were utilized to account for the ineffectiveness of training with the deprived child. By the time a "deprived" child is six years of age patterns of behavior may be too well ingrained to be amenable to remedial treatment. Others (Hunt, 1955; Deutsch, 1964, 1966), for example, have suggested that diverse stimulation must be forthcoming prior to the age of three, or be ineffective in producing significant change. This lack of stimulation may account, in part, for the variable results from Head Start programs. It seems appropriate, in lieu of the results reported here and their implications for developmental theory that a rigorous research program be initiated. The purpose of such an endeavor would be twofold. First, to delineate more clearly the role of social class upon the development of a child's perceptual abilities and secondly, the establishment of experimental pre-nursery school centers for deprived children in order to expose them to a broad band of visual and verbal stimuli, in order to evaluate the accuracy of the critical period concept on the course of later perceptual development. This nursery program would also serve as a vehicle by which effective duration of training and long term benefits of such training could carefully be scrutinized.

CHAPTER VI

SUMMARY

In order to examine the effects of training and socioeconomic class upon visual integrative abilities and their ramifications in the developmental theories of Jean Piaget and Hienz Werner, sixty first grade male children were assigned to one of three training conditions. Thirty boys were from better than average socioeconomic backgrounds, while the remainder were drawn from less than average socioeconomic environment. All subjects were drawn from the Knox County School System and had, at least, Dull-Normal intelligence. Based on existing developmental constructs and research investigating perceptual judgments, the following hypotheses were generated:

1. The developmental sequence for perceptual integrative abilities can be accelerated with training.

2. Training will be more effective with children from a home environment of diverse stimulation and less effective with children from a stilted home environment.

3. A "rich" environment will be more conducive to

integrated perception than a "deprived" background. That is experiential factors are a significant aspect of this development.

4. With respect to the relative effectiveness of training, the specificity of the training task will be a significant factor in the post-training test of ability to perceptually integrate in a hierarchic manner.

The results of the study supported the first, second, and fourth hypotheses. The third hypothesis, though not statistically significant, showed a trend in the predicted direction. Intelligence was not found to be a determinable factor in the ontogeny of perceptual abilities. The results were discussed in terms of the implications and ramifications for the Genetic Theory of Hienz Werner and Sensori-motor Theory of Jean Piaget. Specifically, the concepts of reinforcement for certain classes of experiences and critical periods were invoked. Suggestions for further research in this area and possible relationships to the classroom situation were made.

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APPENDIXES

APPENDIX A

HOLTZMAN TRAINING RESPONSES

Broken Cards:

1A	W+	Two trees with a fence in between
2A	W+	Two men sitting back to back
12A	W+	Girls dancing by a campfire, clouds in the sky, dirt on the ground
39A	W+	Two baby animals eating their food; see their eyes and body
41A	W+	Two girls with funny clothes on, doing a dance on the stage.

Unbroken Cards:

18A	W++	Two funny people fighting; head of nose, feet
	Wm	A big bug; wings and legs.
11A	W++	Two big mountains with a road in between
	Wm	A butterfly
40A	W++	(upside down) Two ugly animals fighting over food
	Wm	A moth.
11B	W++	Two animals sitting back to back; nose, mouth, head, body.
	Wm	(upside down) Flying bug.
36B	W++	A frog. Eyes, nose, mouth, legs; eating a bug
	Wm	Outline of a bug

APPENDIX B

CONTOUR LINE DRAWINGS